Risk-based Decision-making Guidelines

Volume 2
Introduction to Risk-based Decision Making

Chapter 7 — Acronym List and Glossary of Terms

Acronyms

AOR	Area of responsibility
CCF	Common cause failure
COTP	Captain of the port
DOI	Document of Inspection
ETA	Event tree analysis
FMEA	Failure modes and effects analysis
FMECA	Failure modes, effects, and criticality analysis
FTA	Fault tree analysis
HAZMAT	Hazardous materials
HAZOP	Hazard and operability analysis
HRA	Human reliability analysis
IBA	Inflatable buoyancy apparatus
LNG	Liquefied natural gas
LOA	Line of assurance
MSO	Marine Safety Office
MTS	Marine Transportation System
OCMI	Officer in charge of marine inspections
ORM	Operational risk management
PAWSA	Ports and Waterways Safety Assessment
PIW	Person in the water
PQS	Personnel qualification standard
PrHA	Preliminary hazard analysis
PrRA	Preliminary risk analysis
R&D Center	Research and Development Center
R2TAR	Rank Risk, Target Risk
RCM	Reliability-centered maintenance
RIN	Risk index number
SAR	Search and rescue
SEH	Safety, environmental, and health
WET	Waterway evaluation tool
WISE	Worker and instruction safety evaluation

Glossary

Accident	Possible result of a deviation; a loss of interest
Accident sequence or scenario	One pathway from an initiating event (incident) to an unwanted result
Actions	Suggestions for design changes, procedural changes, or further study
AND gate	A Boolean logic element used to develop fault trees. The output event related to this gate exists only if all of the input events exist at the same time.
Asphyxiant hazard	The potential for one or more materials to prevent organisms from using oxygen
Basic events	The lowest level of resolution in a fault tree
Branch point	A graphical illustration used when constructing an event tree, usually of two possible outcomes when a line of assurance is challenged
Causal factors	Key events or conditions, such as human error or equipment failure, that may result in an accident. Causal factors are usually (1) an initiating event for an accident, (2) a failed safeguard, or (3) a reasonable safeguard that was not provided.
Cause	An event that, if not mitigated, may result in an accident
Certainty	The confidence that the risk information generated from a risk assessment is accurate
Change analysis	A risk assessment technique that logically identifies risk impacts and risk management strategies in situations where change is occurring
Checklist analysis	An analysis technique that evaluates a situation against existing guidelines in the form of one or more checklists
Chemical asphyxiants	Materials that prevent organisms from using oxygen
Chemical reactant hazard	The potential for one or more materials to chemically combine, or to self-react, and produce unwanted consequences
Combustible or flammable hazard	The potential for one or more materials to quickly react with an oxidant, releasing energy in the form of heat and light
Common cause failure	Failures that occur because of the same root causes, thus defeating many layers of protection at the same time
Consequences	Unwanted events that can negatively affect subjects of interest
Corrosivity hazard	The potential for one or more materials to chemically burn body tissues, especially the skin and eyes, or to excessively erode or dissolve materials of construction or emergency response equipment
Coupling factors	Factors that lead to common cause failures
Data uncertainty	Lack of confidence in the information used to provide risk assessment results
Decision maker	An individual or group, such as a management team, that uses risk assessment results to make risk-based decisions

Glossary (continued)

Deficiency	The failure of a system or operation to perform as it was intended
Demanded events	One or more events that act, or should act, to interrupt the chain of events stemming from an initiating event or incident
Design intent	A planned action or function that should be performed, based on the design specifications
Deviation	An unusual condition or situation that has the possibility to result in an accident
Effects	Measurable negative impacts on subjects of interest
Electrical energy hazard	The potential for unwanted consequences resulting from contact with, or failure of, manufactured or natural sources of electrical voltage or current. Electrical energy hazards include lightning, electrical charges, short circuits, stray currents, and loss of power sources
Error-likely situation	A situation or characteristic of a system or activity that makes human errors more likely
Error-likely situation checklist analysis	An analysis technique that uses a checklist of human factors issues, either general or specific, on areas of an activity to find current strengths and weaknesses
Event tree analysis (ETA)	An analysis technique that uses decision trees to graphically model the possible results from an initiating event that is able to produce an accident of interest
Event and causal factor charting	A written or graphical description for the time sequence of contributing events of an accident
Explosion hazard	The potential for one or more substances to release energy over a short period of time, creating a pressure wave that travels away from the source
Failed safeguards	Planned protections that fail to prevent or reduce unwanted effects
Failure modes and effects analysis (FMEA)	An approach best suited to reviews of mechanical and electrical hardware systems. The FMEA technique (1) considers how the failure modes of each part of the system can cause system performance problems and (2) makes sure that appropriate safeguards against such problems are in place.
Failure modes, effects, and criticality analysis (FMECA)	A quantitative version of FMEA
Fault tree analysis (FTA)	A deductive analysis that uses Boolean logic to graphically model how logical relationships among equipment failures, human errors, and external events can combine to cause specific accidents of interest
Frequency	The expected number of occurrences, per unit time, of an accident
Frequency range	A lower and upper limit of an accident's estimated frequency of occurrence
Hazard and operability (HAZOP) analysis	An approach that uses a logical process with special guide words to suggest ways in which system sections can deviate from design intents. This approach helps ensure that safeguards are in place to help prevent system performance problems.

Glossary (continued)

Hazards	Situations, conditions, characteristics, or properties that create the potential for unwanted consequences
Human error analysis	An analysis that evaluates the possibility for human actions or inactions that are outside the limits set by a system or operating envelope
Human reliability analysis event tree	An analysis tool that is specialized and graphical, similar to event tree analyses. It is designed for evaluating series of operations that people perform. This technique considers human errors and recovery actions, as well as equipment failures.
Impact assessment	The process of tracking the effectiveness of actions taken to better manage risks. The goal is to be sure that the organization is benefiting from the actions as intended.
Indications	Visual, audible, physical, and odor clues, etc., that suggest to a crew member or some other inspector or troubleshooter that a failure mode has occurred
Initiating event	The event in an accident sequence that begins a chain of events that will result in one or more unwanted consequences unless planned demanded events are successful. Also called an incident.
Issues of concern	Consequences that have a great impact on the organization
Items of note	Unwanted events or conditions identified during an analysis that must be addressed or corrected, but did not lead to the loss event of interest
Kinetic energy hazard	The potential for unwanted consequences resulting from motion of materials, equipment, or vehicles
Line of assurance	A protective system or human action that may respond to an initiating event or incident
Loss	Any action, state, or condition in which a system is not meeting one or more of its design intents and causes unwanted consequences
Model uncertainty	Lack of confidence in the models used in both the overall decision-making structure and in risk assessments that support decision making because of the level of detail in the models and scope limits
OR gate	A Boolean logic element used to build fault trees. The output event related to this gate exists if at least one of the input events exists.
Pareto analysis	A screening assessment tool that uses historical information to identify and rank the most notable areas of interest for more evaluation
Potential energy hazard	The potential for unwanted consequences resulting from (1) high pressures other than explosions (e.g., normal operational pressures), (2) low pressures (e.g., vacuum conditions), or (3) mass, gravity, or height (e.g., lifting operations)
Preliminary hazard analysis (PrHA)	A broad study, used in the early stages of system design, that focuses on (1) identifying apparent hazards, (2) assessing the seriousness of accidents that could occur involving the hazards, and (3) identifying safeguards for lowering the risks of the hazards. The PrHA focuses on identifying weaknesses early in the life of the system, thus saving time and money that could be needed for major redesign if the hazards were found later.

Glossary (continued)

Preliminary risk analysis (PrRA)	A streamlined, accident-centered risk assessment approach. The main objective of the technique is to identify the risk of significant accident scenarios.
Qualitative	Expressible in terms of quality or kind (e.g., too much, too little, very high, very low)
Quantitative	Expressible in terms of quantity (e.g., 100 deaths)
Recommendations	Suggestions and action items for (1) reducing the risk of a deviation or (2) providing further evaluation of specific issues
Relative ranking/risk indexing	A ranking technique that uses features of a system or activity to calculate index numbers that can be used to compare different systems and activities. The numbers can, in some cases, be related to absolute risk estimates.
Risk	A measure combining an undesirable event's frequency and consequence
Risk assessment project management	Activities that ensure the success of a risk assessment project. These activities include defining the scope of the risk assessment, identifying participants, preparing for the risk assessment, directing the meetings, documenting the meetings, writing the report, and implementing recommendations.
Risk assessment	The process of understanding (1) what bad things can happen, (2) how likely they are to happen, and (3) how severe the effects may be
Risk communication	The interactive process of exchanging information and opinion among individuals, groups, and institutions about a risk or possible risk to human health or the environment
Risk index number (RIN)	A quantitative measure of risk used in many risk assessment methods
Risk management	Actions that minimize risk within acceptable limits
Risk matrix	A matrix showing the risk profile of issues analyzed; each cell in the matrix provides the number of accident sequences having that frequency and consequence
Risk-based decision making	A process that organizes information about the possibility for one or more unwanted outcomes into a broad, orderly structure that helps decision makers make better management choices
Root cause analysis	An analysis technique that defines the most basic causes of an event that can be reasonably identified and that management has control or influence to fix
Safeguards	Equipment, procedural, and administrative controls in place to help (1) prevent a situation from occurring or (2) reduce the effects if the situation does occur
Safeguards not provided	Reasonable protections that were not provided but that could have prevented or reduced unwanted effects
Screening	Determining at a general level that an item is of low risk and will not need to be assessed in detail

Glossary (continued)

Sensitivity analysis	An evaluation that determines how (1) a change in one component of a system affects the entire system or (2) a change in one aspect of a risk assessment affects overall results
Simple asphyxiants	Nontoxic gases that replace oxygen necessary to support life
Sponsor	An individual or group that determines the need for a risk assessment. The sponsor is responsible for obtaining results from the risk assessment, and usually has a specific use for the results.
Stakeholders	Individuals or groups possibly affected by the decision. Stakeholder input into the decision-making process is important for reaching the best decisions and improving acceptance for the process and its results.
Subject matter experts	Individuals or groups who take part in the risk assessment, providing expert knowledge and experience about operations, layouts, and possible problems
Successful safeguards	Planned protections that successfully prevent or reduce unwanted effects
Thermal hazard	The potential for very hot or cold temperatures to produce unwanted consequences affecting people, materials, equipment, or work areas
Toxic hazard	The potential for one or more materials to cause biological damage to surrounding organisms by being absorbed through the skin, inhaled, eaten, or injected
Undeveloped events	Events that are not further developed in a fault tree
Value tradeoff	An option that offers more value to the user by providing some important benefit while sacrificing a previously existing, less important benefit
What-if analysis	A brainstorming risk assessment approach that uses broad, loosely structured questioning to (1) suggest system upsets that may result in accidents and (2) make sure that safeguards against those accidents are in place
Worker instructor and safety evaluation (WISE)	A specialized form of HAZOP analysis for assessing human activities through the use of guide words customized for human factors issues, including issues historically addressed through job task analysis
Voting method	Use of a team of experts to review and vote on competing options